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National Aeronautics and Space Administration  
 Lyndon B. Johnson Space Center  
 Houston, Texas 77058

Attention: Dr. Timothy T. White, Code TF6  
 Principal Investigations Management Office

Subject: Contract NAS 9-13305  
 Evaluate the Application of Improved Spacecraft  
 Measurements for Snow Cover Survey Using  
 Skylab/EREP Data (EPN No. 420)

Gentlemen:

This is the first quarterly progress report describing work performed by Environmental Research and Technology, Inc. (ERT), for the National Aeronautics and Space Administration under the subject contract. This report covers the period from 14 March to 14 June 1973.

The purpose of this investigation is to compare and evaluate Skylab data for mapping of snow cover. Visual interpretation of the S190 photographs will be performed to map areas that are snow-covered. The S192 imagery and digital printouts, S193 data, and S194 data will then be compared to the S190 photographs to determine how much additional information on areal extent of snow can be obtained from various spectral bands, thermal data, and microwave data. Snow-depth and area measurements taken routinely by various Government agencies in the Sierra Nevada, Cascades, and Great Plains shall provide ground truth. The relatively high-resolution EREP data will be compared with television and radio-metric measurements from other satellites, and available aircraft imagery, to determine the optimum future system for mapping the areal extent of snow. The results of this investigation will enable a more accurate assessment of the extent of snow cover in the United States and aid in prediction of run-off and better management of the U.S. water resources.

#### A. ACCOMPLISHMENTS DURING REPORTING PERIOD

The contract effort was initiated on 14 March. In accordance with the requirements of the subject contract, the Committed Plan for the Collection and Analysis of Ground Truth Data was submitted to the PIMO

E73-10755) EVALUATE THE APPLICATION OF  
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 COVER SURVEY USING SKYLAB/EREP DATA  
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on 12 April and the Milestone Plan on 18 April. During April, the principal investigator also participated in the EREP simulations conducted by the PIMO. Otherwise, the early part of the contract effort was devoted to preliminary tasks such as reviewing the EREP documentation and contacting the responsible agencies to determine the general snow-cover conditions this spring within the specified test sites.

During early June, mission support was provided for the SL- 2 mission through coordination with the Applications Technique Development (ATD) personnel of the Science Support Team (SST). Because of the season, acceptable snow cover conditions existed in only three of the test sites; Sites 318107 (southern Sierra Nevada in California), 318108 (Cascades in Washington and Oregon), and 318191 (Upper Columbia Basin in northern Idaho and western Montana). Upon notification by the SST of a planned EREP pass over one of these test sites, the latest snow conditions were assessed through contact with the NWS River Forecast Center in Sacramento or Portland and the Corps of Engineers Water Control Section in Sacramento or Seattle. The Corps of Engineers were particularly helpful, since Corps personnel conduct aerial snow surveys in both the Sierras and the Columbia River Basin.

Post mission information from the SST indicates that the desired data requirement was satisfied for Site 318107 and the mandatory requirement for Site 318108. On 3 June, data were collected for Site 318107 on Rev. 290/291, Track 6. Although Track 6 was not considered the optimum for the southern Sierra Nevada test site, the revised track (about 1° west of that originally planned) did cross the northern part of the site in the Lake Tahoe area. The Corps of Engineers reported that substantial snow cover still existed in this area, especially in the more sheltered terrain at the 8,000 to 10,000 ft. level. As a result of a request by the SST, S-193 data were collected on this pass in the radiometer/ scatterometer mode as well as in the radiometer-only mode, as stated in the IRD.

It is also understood that on 11 June, data were collected on Rev. 403/404, Track 48 for Site 318108. Because of a 4-7 tenths cloud cover, however, this data-take satisfies the mandatory but not the desired requirement. More extensive cloud cover limited the data-take to a rather small part of the overall test site; nevertheless, it is believed that useful snow cover data will result, especially for the Mt. St. Helens area in Washington.

EREP passes on 9 and 10 June (Tracks 19 and 5, respectively) crossed Site 318191. Although acceptable snow cover was reported in certain of the mountain ranges within the site, cloud obscuration prevented a successful data-take on either day.



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B. PLANS FOR NEXT REPORTING PERIOD

During the next reporting period, additional correlative data will be acquired for the areas for which EREP data were collected on the SL-2 mission. Measurements made for the California Cooperative Snow Survey Program should be a valuable source of ground- truth in the Lake Tahoe area. Similar snow survey measurements for the Cascades should be available from the Soil Conservation Service. Upon receipt of the first SL-2 data, the data analysis will be initiated as specified in the Statement of Work of the subject contract.

During the next reporting period, mission support will be provided for the SL-3 mission. It is anticipated that even during the mid-summer period, acceptable snow cover conditions will exist in the higher elevations of the northern Cascades. The most promising EREP tracks are Tracks 5 and 62 (Test Site 318108). To maximize the probability of collecting useable data, it would be beneficial to extend the boundaries of Site 318108 to include the Cascades of northern Washington (Track 5) and the Olympic Mountains of western Washington (Track 62). The PIMO will be contacted early in the next reporting period to discuss this possibility.

C. SUMMARY OUTLOOK

It is anticipated that the EREP data collected on the SL-2 mission will be sufficient to undertake the initial analysis as specified in the Work Statement of the subject contract. With the SL-3 and SL- 4 missions carried out as planned, it is believed that the objectives of the study can be successfully met.

D. FINANCIAL REPORT

In accordance with Appendix A of the Work Statement of the subject contract, the Financial Management Report is being submitted as a separate document.

Very truly yours,

James C. Barnes  
Principal Investigator

JCB:jc